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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/054,414	01/22/2002	Chang-Won Choi	8045-33 (PX1441-US/SSD)	5089

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EXAMINER	
KACKAR, RAM N	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 09/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/054,414	CHOI ET AL.	
	Examiner	Art Unit	
	Ram N Kackar	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 August 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2 Claims1 and 7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In these claims recitation is made of the resistivity of the edge ring being less than the resistivity of a silicon wafer. Since wafer is not a part of the chuck assembly but placed on it for processing, the resistivity of the wafer may change with change of impurities, dopants and crystalline structure. Moreover the resistivity of substrate changes during processing. The claimed resistivity of edge ring being lower than the resistivity of silicon substrate therefore becomes indefinite. Regarding the claimed spacing, it should be understood that the distance from an edge of a wafer to a fixed edge ring depends upon the diameter of the substrate, which also may change from substrate to substrate. (See MPEP 2173.05(b)).

Claim Rejections - 35 USC § 103

3 The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4 Claims1 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants admitted prior art (AAPR) in view of Roderick et al (US 6074488) and Ke et al (US 6284093).

AAPR (Fig 2) discloses an edge ring with a slanted step portion (Fig 2), which appears to have the same angle as the invention (Fig 4). The difference between the invention and AAPR being the resistivity of the material of the edge ring.

Roderick et al discloses an edge ring (Fig 2-230) and teach that it is made of a low resistance semiconductor dielectric like silicon and could also be doped to further adjust resistivity or conductivity (Col 8 line 49 to Col 9 line 24). The typical resistivity is disclosed to be (10^{-3} Ωcm - 10 Ωcm) which is much lower than the resistivity of pure silicon (2.5x 10^{5} Ωcm).

Ke et al disclose a slant angle in an embodiment being 55 degrees (Col 18 lines 17-23) and teach that the slant angle (Col 11 lines 3-8) and spacing (Col 11 lines 33-35) produce a focusing effect which modifies the ion flux distribution and therefore must be determined empirically. Ke et al also teach that the RF coupling is inversely proportional to the electrical resistivity of the silicon ring (Col 13 line 44-45). Ke et al teaching provides a framework under which the geometry of the ring could be optimized.

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to optimize the resistivity, slant angle and spacing of the edge ring to obtain consistent and uniform plasma sheath for uniform processing. This type of optimization has been held obvious.

Response to Arguments

Applicant's arguments filed 8/16/2004 have been fully considered but they are not persuasive.

Applicant argues that the spacing S is a different parameter than the distance "l". Ke et al describe spacing as S as the distance from the edge of the wafer to the slanted face. Clearly "l" as the distance from the edge of the wafer to the point where the slant starts is offset by a constant value. Optimization of the angle and S readily provides "l" and angle. Ke et al use W in Fig 8A and 8B to disclose similar spacings. It should be understood that everything else remaining same this spacing changes as the size of the substrate changes.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ram N Kackar whose telephone number is 571 272 1436. The examiner can normally be reached on M-F 8:00 A.M to 5:P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on 571 272 1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RK

GREGORY MILLS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700